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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/550,504	09/22/2005	Tomohiro Yamada	28953.7287	9973
27890	7590	09/18/2007		
STEPTOE & JOHNSON LLP 1330 CONNECTICUT AVENUE, N.W. WASHINGTON, DC 20036			EXAMINER GUGLIOTTA, NICOLE T	
			ART UNIT 1709	PAPER NUMBER
			MAIL DATE 09/18/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/550,504

Applicant(s)

YAMADA, TOMOHIRO

Examiner

Nicole T. Gugliotta

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 - 5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 - 5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - 3) ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 6/15/2007, 9/22/2005.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_.

### **DETAILED ACTION**

1. The abstract of the disclosure is objected to because the abstract should be limited to 150 words. Applicant's abstract contained 180 words. Correction is required. See MPEP § 1302.01.

### **Summary of Applicant's Claims**

2. Applicant claims a ceramic filter resembling that of a honeycomb structure, comprising filtration membranes on the inner partition wall surfaces of the main flow passages (hexagonal cells in drawings). In a cross-section perspective of the filter, first specific main flow passages (heptagonal cells) line up along the rectangular cells, which create two parallel lines apart at a specific distance (a row of rectangular cells). These heptagonal or "superior to heptagonal shaped" cells are arranged between the second specific main flow passages (rectangular cells) and the main flow passages (hexagonal cells). These heptagonal cells have angles of  $110 - 160^\circ$ . The heptagon sides flushed against the rectangular cells (A) are  $0.3B - 0.7B$ , B being the diameter of the heptagon. The fluid is allowed to permeate the inner walls of the main flow passage cells, comprised of a filtration membrane, and inside of the porous body to be purified.

The ceramic filter with predetermined main flow passages (hexagonal cells) whose opposite end-surface openings are plugged, slit-like auxiliary flow passages (rectangular cells) are formed in portions including the outer peripheral surface of the

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porous body so that the second specific main flow passages (rectangular cells) communicate with an external space. The cross section shapes of rows of second specific main flow passages (rectangular cells) and rows of main flow passages (hexagonal cells), is a repeated pattern (2 – 8 rows of main flow passages), which are arranged subsequently to one row of second specific main flow passages.

### Mathematical Analysis of a Regular Heptagon

3. The angles, lengths, and distances of the heptagon claimed by applicant in claim 1 are inherent. As evidence of inherency, the Math Open Reference Webpage discloses the angle of a regular heptagon to be  $128.571^\circ$  (<http://www.mathopenref.com/heptagon.html>). The angle of a regular heptagon falls within applicant's claimed range of  $110 - 160^\circ$ .

The length of the side of any polygon can be determined based on the following formula:

$$side = 2r \sin(\pi/n),$$

where  $r$  is the radius,  $\pi$  is 3.14 and  $n$  is the number of sides to the polygon, and  $side$  is the length of any side of the polygon (<http://www.mathopenref.com/polygonsides.html>).

The diameter of any shape is twice that of the radius. Therefore  $2r$  is equal to what applicant refers to as "B", the distance between two opposing sides. The length of one side of the heptagon (assuming a regular heptagon) would be what applicant refers to as "A". A heptagon has 7 sides, therefore  $n = 7$ . When this information is substituted

into the equation above, we find that for a regular hexagon, the length of one side, A, is 0.4B, which falls within applicant's claimed range of A between 0.3B and 0.7B.

Therefore the ranges of the heptagonal angles, lengths and distances claimed by applicant are inherently known based upon the commonly known angles and equations for a regular heptagon.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

5. The phrase "polygonal shapes equivalent or superior to" in claim 1 is a relative term, which renders the claim indefinite. The term "superior to" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Examiner would like clarification as to applicant's definition of "superior" with regard to polygons, including which polygons would be considered "superior", which ones would not be considered "superior" and why.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

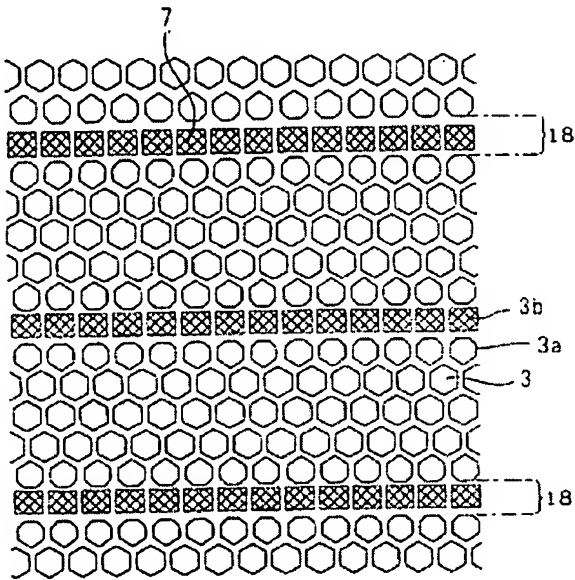
7. Claims 1 – 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yorita et al. (U.S. Patent No. 5,855, 781).

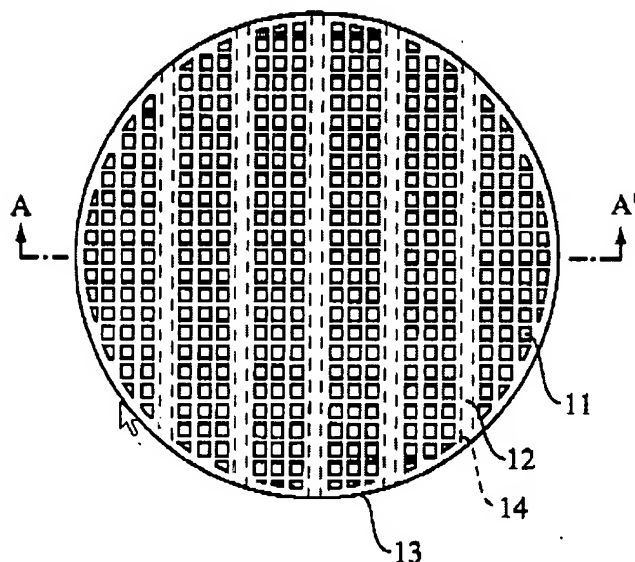
8. In regard to claim 1, Yorita et al. disclose a monolithic ceramic filter comprising filtrate discharging conduit openings and communication voids separated from cells of a honeycomb structure of the filter by cell partition walls, with the voids and conduit opening being in communication with the lateral outside of the honeycomb structure. The voids continue axially through the honeycomb structure and the conduit openings are perpendicular to the long axis of the honeycomb (Column 2, Lines 18 – 23, Column 6, Line 62 – Column 7, Line 6). The filtrate discharging conduit openings (14) are equivalent to applicant's slit-like auxiliary flow passages (Column 5, Lines 8 – 13, Figures 2 & 3). Filtration through a filtration membrane before the filtrate is purified inside the porous ceramic walls and discharged out of an outer wall (Column 3, Lines 23 – 39, and Fig. 10). The cross-section cells may be other polygonal shapes, besides squares. Therefore, heptagonal squares may also be used. (Column 5, Lines 61 – 64).

9. In regard to claim 2, Yorita et al. teach two or more sets of parallel lines, each set comprising two parallel lines (Fig. 2).

**Invention of Applicant**

**FIG. 6**



**Invention of Yorita et al.****FIG. 2**

10. In regard to claim 3, Yorita et al. teach the supporting member to have a diameter and a length of 150 mm (Column 6, Lines 34 – 35).

11. In regard to claim 4, Yorita et al. teach end frames with extrusions engaged in the communication voids or the groove-shaped recesses to close the communication voids at the end of the honeycomb structure (Column 2, Lines 35 – 39, Column 5, Lines 39 - 51). These are equivalent to applicant's plugged end-surface openings of main flow passages.



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12. In regard to claim 5, it is evident by Figures 1 & 2 in the Yorita et al. that a repeated pattern of rows of main flow passages, which are arranged subsequently to one row of second specific main flow passages.

13. It would be obvious to one skilled in the art at the time the invention was made to manufacture a ceramic honeycomb with main flow passages and secondary passages that communicate with the outside of the structure. While Yorita et al. may use different polygon shapes, it has been stated in their patent that any polygon shape may be used for the cross-section cells and the transverse cells. Yorita et al. does not speak of main flow passages vs. first specific main flow passages because it is unnecessary. All of the raw fluid supply passages (equivalent to main flow passages and first specific main flow passages) are of the same polygon shape. However, changing the shape of selected cells and referring to them by a different name does not change their function. What the applicant refers to as main flow passages and specific main flow passages serve the same purpose. The partition wall (12) and filtrate discharge openings (14) of U.S. Patent No. 5,855, 781 serve the same purpose as applicant's specific partition wall part and second specific main flow passage, respectively.

14. Claims 1 - 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuo et al. (JP 2000-342920), in view of LaBarge (US 2003/0198579 (Filed 4/22/2002)).

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15. In regard to claim 1, Yasuo et al. teaches the same ceramic honeycomb filter claimed by applicant. There would be a main flow passage of hexagonal cells, as well as second specific main flow passages of rectangular cells. The only difference between applicant's claimed invention and the invention of Yasuo et al. is that the first specific main flow passages are pentagonal shaped cells (what Yasuo et al. refers to as "5 angle cells"), instead of heptagonal shaped cells, which are arranged between the hexagonal and rectangular flow cells.

16. In regard to claim 2, 2 or more sets of parallel lines, each set comprising two parallel lines, can be easily seen by Drawings 1a, 3a, 3b, 5 and 4a. Yasuo et al. also describe these parallel lines in Sections 0030 and 0032.

### Invention of Applicant

FIG. 1(b)

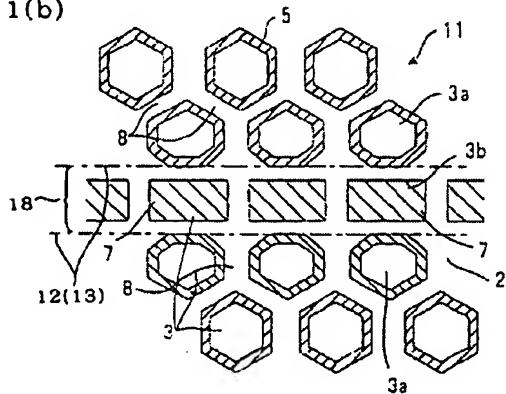
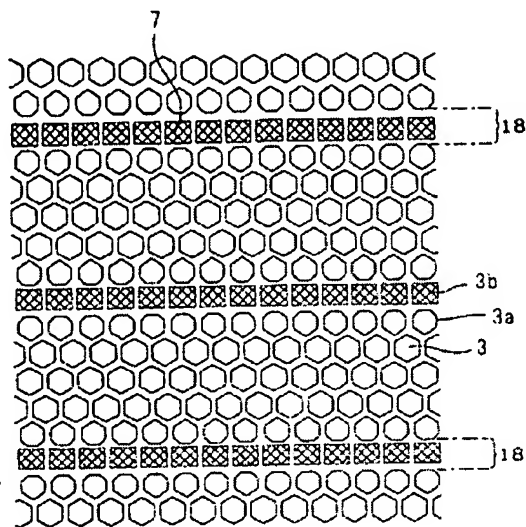
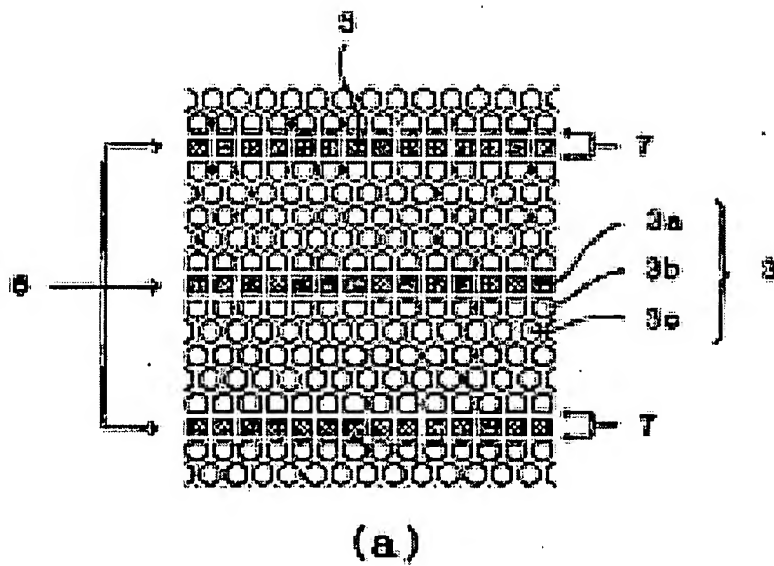


FIG. 6



Invention of Yasuo et al.



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17. In regard to claim 3, Yasuo et al. teach an outside diameter of 180 mm $\phi$  length of 1000 mm (Section 0034).

18. In regard to claim 4, the "slit-like auxiliary flow passages" claimed by applicant are described by Yasuo et al. in Sections 0035, 0037. The "main flow passages whose opposite end-surface openings are plugged" are described by Yasuo et al. as "a closure member", labeled number 5 in the drawings and is described in Section 0039, as "closing the opening of the base material edge in airtight by a jam up member etc..."

19. In regard to claim 5, Yasuo et al. teach a total of 18 straight-line-like cell walls formed on both sides of a nine-row cell train (Section 34). Drawings 1a and 5 demonstrate 3 main flow passages arranged subsequently to one row of second specific main flow passages. Drawing 4a demonstrates 5 main flow passages arranged subsequent to one row of second specific main flow passages.

20. LaBarge discloses a catalyst substrate, which can have honeycomb geometry, be made of ceramic, and have any multisided polygonal or round shaped cells, which include heptagonal shaped cells (Section 0016).

21. In regard to claim 3, 180 is greater than 70, therefore falls within range claimed by applicant for the maximum diameter of the ceramic filter.

It would be obvious to one skilled in the art at the time the invention was made to insert heptagonal shaped cells in place of the pentagonal shaped cells, due to their similar characteristics. Both heptagonal and pentagonal shaped cells would provide a flat side that would be flush with the straight rectangular cells, while still fitting nicely between the hexagonal cells on the opposite side. For a visual comparison, drawings from each

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application are shown below. Applicant has shown in Fig.1 (b) and Fig.6 the heptagonal cells (3a) and in the drawing (a) below that Yasuo et al. demonstrates the second specific main flow passages to be pentagonal cells (3b).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole T. Gugliotta whose telephone number is 571-270-1552. The examiner can normally be reached on M - F (first Friday off) 7:30 a.m. - 5 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on 571-271-1550. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Nicole T. Gugliotta  
Examiner  
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**D. LAWRENCE TARAZANO**  
**PRIMARY EXAMINER**

A handwritten signature in black ink, appearing to read "Lawrence Tarazano", is written over a large, stylized, handwritten "P" or "D" that loops around the signature.